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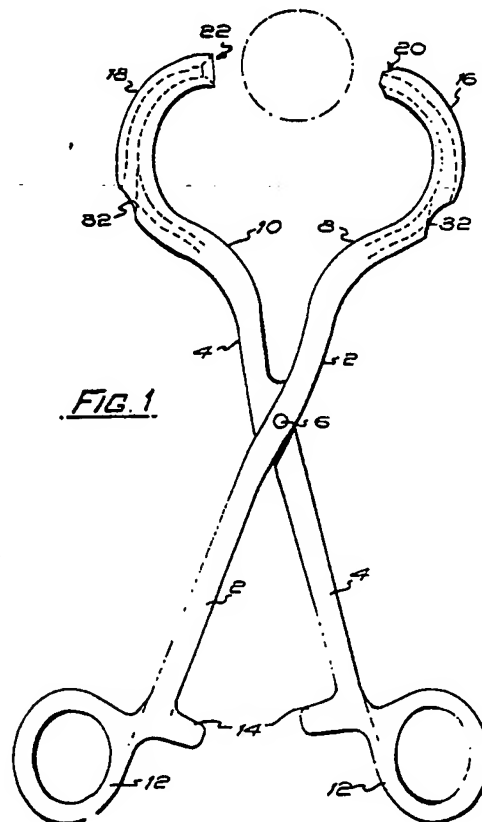
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US 4312337 A

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(54) **Surgical apparatus for guiding a wire or suture in a loop**

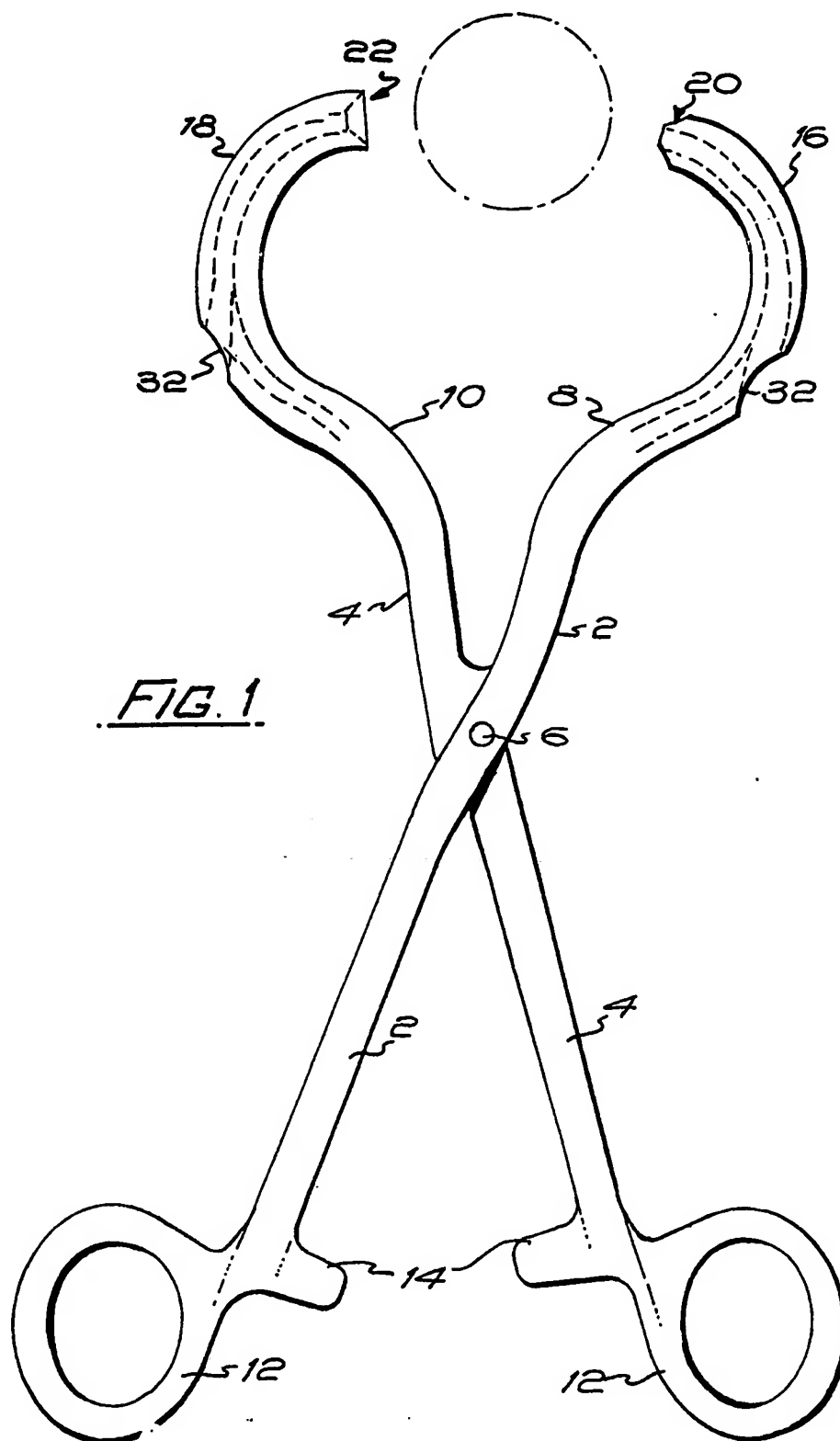
(57) Apparatus for introducing a wire or suture behind e.g a bone in orthopaedic surgery comprises a pincers-like device of which the jaws 8, 10 comprise tubes, open at their free ends 20, 22 and each having an opening 32 spaced from its free end. The jaws may be opened to allow passage to the rear of the bone and then closed behind the bone. A wire can then be passed into one tube through its opening 32, along the tube into the other tube and out through the opening 32 of this other tube.

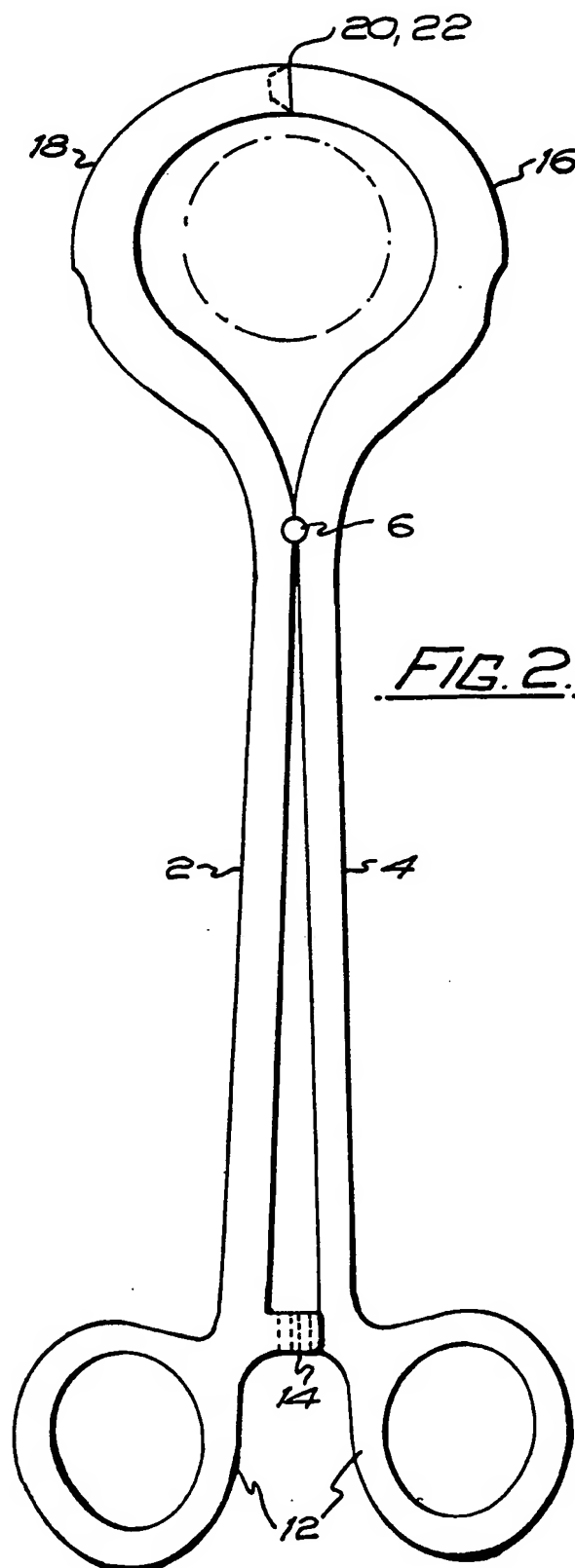


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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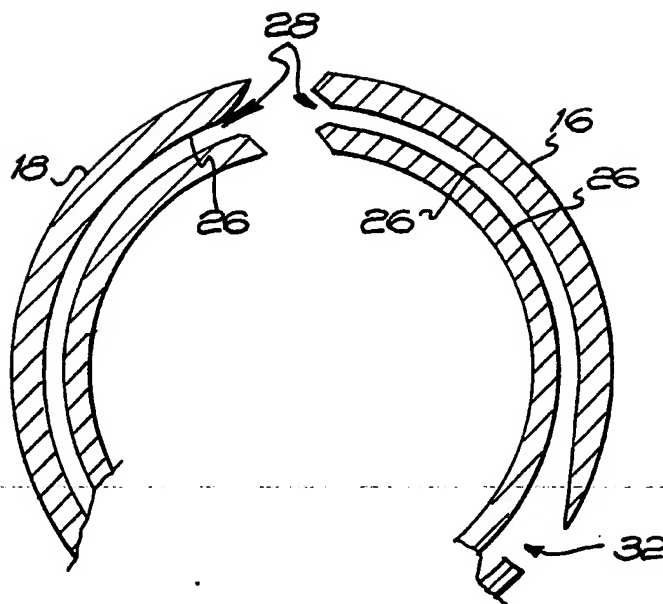


FIG. 3.

Surgical Apparatus

The invention relates to apparatus for passing a wire, suture or the like behind a bone or other obstacle during surgery.

Specifically, the invention relates to an appliance for use in orthopaedic surgery when it is required to surround a fractured bone with a tight loop of wire. In order to minimise damage to surrounding tissue it is desirable to make an incision only to one side of the bone, and once the wire has been passed around the back of the bone it is a relatively simple matter to tighten the wire from the front. The problem which the invention seeks to solve is that of passing the wire behind the bone in the first place.

According to the invention, therefore, there is provided surgical apparatus comprising means defining first and second wire guide elements, each having a wire inlet and a wire outlet, said elements being relatively movable between a first position, wherein the outlet of one element and the inlet of the other element are spaced apart for introduction, from the front of an obstacle such as a bone, respectively to the sides thereof, and a second position wherein the said inlet and outlet are capable of cooperating so that wire projecting from the outlet of the one element may enter the inlet of the other element.

Preferably the said inlet and outlet are juxtaposed in said second position, and the arrangement may be that the juxtaposition may occur centrally behind the bone.

Preferably again the elements are pivotally connected for said relative movement, and the apparatus may further comprise means for releasably securing the elements in said second position.

The guide elements may comprise tubular members and may be interchangeable in the sense that in each member the wire inlet may become an outlet and the outlet become an inlet.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings showing one embodiment of which:-

Fig. 1 is a side view thereof in open condition

Fig. 2 is a side view thereof in closed condition

Fig. 3 is a detailed sectional view of a portion thereof.

As shown in the Figures the apparatus comprises a pair of elongate members 2, 4, crossed, scissor-like, and pivoted to one another at 6 where they cross. To one side of the pivot 6 they define a pair of jaws 8, 10 whilst to the other side of the pivot they terminate in a pair of handles 12. Adjacent the handles the members are provided with projections 14 directed each towards the other. One face of each of the projections 14 has a saw-tooth configuration so that when the projections overlap, that is when the handles 12 are brought close together, the saw-teeth interlock.

The terminal portions 16, 18 of the respective jaws 8, 10 are tubes formed substantially into a similar semi-circle, so much so that when the ends 20, 22 are brought together, the tangent to the respective portions 16, 18 at the ends are parallel and in fact co-linear. The semi-circles are of such diameter as to be capable of surrounding a bone of the size which is required to be repaired. It will clearly be of advantage for the surgeon to have a range of instruments available of different sizes.

As shown in Fig. 1 the jaws 8, 10 are open wide enough to allow passage of a bone (shown in chain-dotted line) between the ends 20, 22, whilst in Fig. 2 the jaws are shown to be closed around the bone, with the ends 20, 22 in contact with one another. The whole instrument is made of surgical steel and this material has a considerable resilience so much so that if, after the ends 20, 22 have been brought into contact the handles 12 are brought even closer together, a compressive force will be exerted at the junction of the ends. The handles 12 are arranged to be retained in their close proximity by the overlapping of the projections 14 and the interlocking of their mutually-facing saw-toothed surfaces.

The tubes forming the portions 16, 18 open at the ends 20, 22, and the wall of each tube is cut away at 32 to provide access ports leading tangentially into the central bore 24 in the direction of the open end. It will be seen from Fig. 1 that the access ports 32 are substantially diametrically opposed to one another and are formed in the portion of the circumference of each tube facing away from the other.

As shown in the sectional view, Fig. 3, the inner wall 26 of each of the tubes 16, 18 is slightly chamfered so that the bore 24 of the tube is flared towards its open mouth 28. Between the edge of the mouth and the outer surface 30 each tube is evenly tapered to the same angle but in the opposite direction to the taper in the other. The results is that when the jaws are closed as in Fig. 2 the end 20 fits into the end 22, the taper ensuring complete alignment of the flared mouths of the bores of the respective tubes.

In use of the apparatus, the bone to be repaired is exposed by an incision from one side and, with the jaws open the ends 20 and 22 of the tubes 16 and 18 are introduced carefully to the respective sides of the bone and closed together behind the bone by operation of the handles 12. The handles are then brought even closer together so that the projections 14 interlock as explained above and the tapered ends 20, 22 interengage under compression.

One end of a suitable length of surgical wire is then entered into one of the tubes 16, 18 via the port 32 and passed in the direction of the mouth 28. The end of the wire is preferably rounded and this fact, combined with the parallelity of the tubes at their ends, the flaring of the mouths of the respective tubes and the precise alignment of the bores of the tubes, results in an assured passage of the end of the wire out of the said one tube and into the other. A further passage of the wire results in the rounded leading end passing along the other of the tubes, probably following the outer surface of the bore, until it reaches the further access port 32 where it exits from the tube in a direction substantially parallel to the length direction of the instrument.

The interlocking projections 14 are then released by moving the handles 12 relatively to one another perpendicularly to the plane of Fig. 1, the jaws are carefully opened and withdrawn past the sides of the bone and out of the incised opening, the wire sliding along the tubes 16, 18 and the free ends thereof eventually being released from the ends 20, 22 of the jaws. The free ends are then available for crossing towards the front of the bone, tightening and twisting together in the known surgical technique.

CLAIMS

1. Surgical apparatus comprising first and second wire guide elements, each having a wire inlet and a wire outlet spaced from one another, said elements being relatively moveable between a first position, wherein the outlet of one element and the inlet of the other element are spaced apart for introduction, from the front of an obstacle such as a bone to the respective sides thereof, and a second position, wherein the inlet and outlet are juxtaposed so that wire projecting from the outlet of the one element may enter the inlet of the other element.
2. Apparatus according to Claim 1 wherein the guide elements are tubes.
3. Apparatus according to Claim 1 or Claim 2 wherein the inlet of one element and the outlet of the other element are adapted to co-operate to facilitate the passage of wire therebetween.
4. Apparatus according to any one of the preceding claims wherein the elements are adapted to be releasably secured in the second position.
5. Apparatus according to any preceding claim wherein the elements are pivotally connected for said relative movement.
6. Surgical apparatus substantially as described with reference to the drawings.